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1. A microwave plasma processing apparatus comprising:
- a wavelength reducing member reducing a wavelength of a microwave transmitted therethrough;
  - a slot electrode guiding the microwave exiting the wavelength reducing member, the slot electrode provided adjacent to the wavelength reducing member;
  - a first temperature control device controlling a temperature of at least one of the slot electrode and component parts including the wavelength reducing member provided in the vicinity of the slot electrode; and
  - a process chamber into which the microwave exiting the slot electrode is introduced so that plasma is generated by the microwave within the process chamber.
2. The microwave plasma processing apparatus as claimed in claim 1, wherein the first temperature control device controls the temperature of the slot electrode to be in a predetermined temperature range so as to promote a water component being released from other components in the process chamber.

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6. The microwave plasma processing apparatus as claimed in claim 1, further comprising a dielectric

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placing an object to be processed in a process chamber;

controlling a temperature of a slot electrode radiating a microwave toward the process chamber by utilizing transmission of heat between the slot electrode and other component parts surrounding the slot electrode;

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20                    11. The plasma processing process as claimed in  
claim 10, wherein the step of controlling a temperature  
includes the step of:

controlling a temperature of a wavelength  
25 reducing member so as to control the temperature of the  
slot electrode by utilizing transmission of heat between  
the wavelength reducing member and the slot electrode, the  
wavelength reducing member reducing a wavelength of the  
microwave supplied to the slot electrode;

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controlling a temperature of a dielectric material member provided between the slot electrode and the process chamber so as to control the temperature of the slot electrode by utilizing transmission of heat between the dielectric material member and the slot electrode.

13. The plasma processing process as claimed in claim 10, further including the step of controlling a temperature of an object to be processed within the process chamber.

14. A plasma processing method comprising:  
placing an object to be processed in a process

25           controlling a pressure inside the process  
          chamber;  
          controlling a temperature of a slot electrode  
          radiating a microwave toward the process chamber;  
          introducing a reaction gas into the process  
30   chamber;

supplying a microwave to the slot electrode when a temperature of the slot electrode is below a predetermined temperature; and

processing the object by plasma generated by the reaction gas and the microwave introduced into the process chamber.

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15. The plasma processing process as claimed in claim 14, wherein the step of controlling a temperature includes the step of:

controlling a temperature of a wavelength reducing member so as to control the temperature of the slot electrode by utilizing transmission of heat between the wavelength reducing member and the slot electrode, the wavelength reducing member reducing a wavelength of the microwave supplied to the slot electrode;

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16. The plasma processing process as claimed in claim 14, wherein the step of controlling a temperature includes the step of:

controlling a temperature of a dielectric material member provided between the slot electrode and the process chamber so as to control the temperature of the slot electrode by utilizing transmission of heat between the dielectric material member and the slot electrode.

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